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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/587,130	12/28/2007	Bernd Rech	23672	3123

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KF ROSS PC
5683 RIVERDALE AVENUE
SUITE 203 BOX 900
BRONX, NY 10471-0900

EXAMINER
BERMAN, JASON

ART UNIT	PAPER NUMBER
1795	

NOTIFICATION DATE	DELIVERY MODE
09/03/2010	ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

EMAIL@KFRPC.COM
ereyes@kfrpc.com

Office Action Summary	Application No.	Applicant(s)	
	10/587,130	RECH ET AL.	
	Examiner	Art Unit	
	Jason M. Berman	1795	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *6/20/10*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *2-20* is/are pending in the application.

4a) Of the above claim(s) *8-16* is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *2-7 and 17-20* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Status of the Claims

Claims 2-20 are pending in the current application.

Claims 8-16 are withdrawn as being directed towards a non-elected invention.

Response to Amendment

Applicant's amendment of 6/20/10 does not render the application allowable.

Status of the Rejections

All rejections from the previous office action are withdrawn.

New grounds of rejection under 35 USC 103(a) are necessitated by the amendments.

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

2. The factual inquiries set forth in *Graham* **v.** *John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.

3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

3. Claims 2, 4-5, 7 and 17-20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kariya (US 6,107,116) in view of Xiong (US 6,537,428) and Yamada (US 2002/0190814).

As to claim 20, Kariya discloses a method for producing a conductive and transparent zinc oxide layer on a substrate by reactive sputtering comprising:

- Using a doped metallic Zn target with a doping content of less than 2.3 at% (col 8 lines 24-60: Zn target with fluorine doping; col 5 lines 2-3: 0.1 - 10 at% doping content);
- Heating the substrate to a substrate temperature of greater than 200°C (col 8 lines 24-60: substrate temperature 200-600°C); and
- Setting a static deposition rate of more than 190 nm/min (col 13 line 39: deposition rate up to 10nm/sec (600 nm/min)).

Kariya, while disclosing the reactive deposition of ZnO, is silent as to the selection of a stabilized operating point within the unstable process region and the subsequent etching of the ZnO layer.

Xiong discloses a method of reactive sputtering of a Zn target in an O2 atmosphere in which the reactive gas flow is controlled to maintain the deposition in the transition region between metal and poisoning mode (abstract; claims 4 and 5: Zinc with oxygen reactive sputtering; figure 2: showing control of oxygen flow rate to maintain

deposition in transition mode). This operating point provides a high rate of deposition of high quality films (abstract).

Yamada discloses a method of forming an electronic device in which a zinc oxide layer is formed by reactive sputtering (paragraph 45: ZnO piezoelectric layer; paragraph 104: sputter deposition to form layer). Yamada also discloses both the desired RMS roughness of the ZnO layer (paragraph 104: no greater than 5% of the layer thickness, layer thickness of up to 2 microns) and the subsequent etching of the ZnO layer to form the desired pattern (paragraph 175: wet etching of ZnO layer).

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to select an operating point in the unstable transition region, as disclosed by Xiong, in the method of Kariya, because this allows for a high deposition rate and formation of a high quality film (Xiong at abstract).. Additionally, it would have been obvious to one of ordinary skill in the art at the time of the invention to etch the ZnO layer, as disclosed by Yamada, in the method of Kariya as modified by Xiong, because this allows for the formation of a desired pattern and shape of the etched layer (Yamada at paragraph 175).

It should be noted that Kariya does not explicitly state the dynamic deposition rate for the sputtering process. Kariya does disclose the static deposition rate and the movement of the substrate (col 13 line 39: deposition rate up to 10nm/sec (600 nm/min); figure 4) and the formation of a ZnO layer of 1-50 nm (col 12 line 34). Therefore, it would have been obvious to one of ordinary skill in the art at the time of the

invention to use a dynamic deposition rate of greater than 50 nm*m/min in order to successfully form this layer at the required thickness with the stated deposition rate.

As to claim 2, Kariya discloses the doping content is less than 1.5 at% (col 5 lines 2-3: 0.1 -10 at% doping content)

As to claim 4, Kariya discloses the substrate is heated to temperatures above 250° C (col 8 lines 24-60: substrate temperature 200-600°C).

As to claim 5, Kariya discloses a static deposition rate of more than 300 nm/min (col 13 line 39: deposition rate up to 10nm/sec (600 nm/min)).

It should be noted that Kariya does not explicitly state the dynamic deposition rate for the sputtering process. Kariya does disclose the static deposition rate and the movement of the substrate (col 13 line 39: deposition rate up to 10nm/sec (600 nm/min); figure 4) and the formation of a ZnO layer of 1-50 nm (col 12 line 34). Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to use a dynamic deposition rate of greater than 50 nm*m/min in order to successfully form this layer at the required thickness with the stated deposition rate.

As to claim 7, Kariya discloses a dynamic flow process where the substrate is moved during sputtering (figure 4: showing movement path of substrate through various processing chambers).

As to claim 17, Kariya discloses the doping content is less than 1 at% (col 5 lines 2-3: 0.1 -10 at% doping content)

As to claim 18, Kariya discloses the substrate is heated to temperatures above 300° C (col 8 lines 24-60: substrate temperature 200-600°C).

As to claim 19, Kariya discloses a static deposition rate of more than 380 nm/min (col 13 line 39: deposition rate up to 10nm/sec (600 nm/min)).

It should be noted that Kariya does not explicitly state the dynamic deposition rate for the sputtering process. Kariya does disclose the static deposition rate and the movement of the substrate (col 13 line 39: deposition rate up to 10nm/sec (600 nm/min); figure 4) and the formation of a ZnO layer of 1-50 nm (col 12 line 34). Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to use a dynamic deposition rate of greater than 50 nm*m/min in order to successfully form this layer at the required thickness with the stated deposition rate.

4. Claims 3 and 6 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kariya in view of Xiong and Yamada, as applied to claim 1 above, and further in view of Kon ('Impedance Control of Reactive Sputtering Process in Mid-Frequency Mode with Dual Cathodes to Deposit Al-Doped ZnO Films' as cited in IDS).

As to claim 3, Kariya discloses a doped Zn target, but is silent as to the use of Al as the doping material.

Kon discloses a method of forming a transparent and conductive zinc oxide layer using a doped Zn target by reactive sputtering in a transition mode (page 263: introduction). Kon also discloses that aluminum doped ZnO films (AZO) are superior for use in optoelectronic devices because of their reduced resistivity (page 263: introduction).

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to use an Al doped target, as disclosed by Kon, in the method of Kariya, because this forms an effective optoelectronic layer.

As to claim 6, Kariya discloses use of RF magnetron sputtering (col 9 line 19), but is silent as to a dual magnetron arrangement with medium frequency excitation.

Kon discloses a method of forming a transparent and conductive zinc oxide layer using a doped Zn target by reactive sputtering in a transition mode (page 263: introduction). Kon also discloses the use of dual magnetrons with mid-frequency excitation (title; page 264: experimental data).

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to use dual magnetrons with mid-frequency, as disclosed by Kon, in the method of Kariya, because this allows for a greater deposition rate and effective formation of an optoelectronic layer.

Response to Arguments

5. Applicant's arguments with respect to claim 20 have been considered but are moot in view of the new ground(s) of rejection. As discussed above, Yamada discloses that it is well known in the art to subsequently etch deposited layers (including sputter deposited ZnO layers) because this allows for the formation of desired patterns in thin film electrical components (Yamada at paragraph 175).

6. Applicant additionally argues that Kariya and Xiong are not applicable to the instant claims because neither Kariya nor Xiong disclose the selection of the operation

point for the purpose of controlling the etching process. As discussed above, Kariya in view of Xiong discloses that it is well known in the art to control and select the operating point of a reactive sputter deposition process, including that of ZnO (Xiong at figure 2: showing control of oxygen flow rate to maintain deposition in transition mode). The argument that the purpose of the performed method steps in the current application is different from that of the prior art does not present a patentable distinction. If the prior art, as discussed above, controls the process to the same operation set point, merely performing the same process steps for a different purpose is not a patentable distinction. Distinctions must be made in the actually claimed method steps.

Conclusion

7. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of

the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jason M. Berman whose telephone number is (571)270-5265. The examiner can normally be reached on M-R 8am-5pm EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nam Nguyen can be reached on (571)272-1342. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Nam X Nguyen/
Supervisory Patent Examiner, Art Unit 1753

/J. M. B./
Examiner, Art Unit 1795
8/31/2010